Advancements in the Development of an Operational Lightning Jump Algorithm for GOES-R GLM

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Rapid increases in total lightning have been shown to precede the manifestation of severe weather at the surface. These rapid increases have been termed lightning jumps, and are the current focus of algorithm development for the GOES-R Geostationary Lightning Mapper (GLM). Recent lightning jump algorithm work has focused on evaluation of algorithms in three additional regions of the country, as well as, markedly increasing the number of thunderstorms in order to evaluate the each algorithm's performance on a larger population of storms. Lightning characteristics of just over 600 thunderstorms have been studied over the past four years. The 2σ lightning jump algorithm continues to show the most promise for an operational lightning jump algorithm, with a probability of detection of 82%, a false alarm rate of 35%, a critical success index of 57%, and a Heidke Skill Score of 0.73 on the entire population of thunderstorms. Average lead time for the 2σ algorithm on all severe weather is 21.15 minutes, with a standard deviation of +/- 14.68 minutes. Looking at tornadoes alone, the average lead time is 18.71 minutes, with a standard deviation of +/-14.88 minutes. Moreover, removing the 2σ lightning jumps that occur after a jump has been detected, and before severe weather is detected at the ground, the 2σ lightning jump algorithm's false alarm rate drops from 35% to 21%. Cold season, low topped, and tropical environments cause problems for the 2σ lightning jump algorithm, due to their relative dearth in lightning as compared to a supercellular or summertime airmass thunderstorm environment.

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140 s 9 17 6 35 207